

C. L. Johnson

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RECOMMENDED IMPROVEMENTS TO TEST FACILITIES
ISAFB OR [REDACTED]

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The radar test facilities at [REDACTED] have been reviewed for the purpose of recommending changes in this equipment when it is moved to the new location at the [REDACTED]. Briefly, these recommended changes are as follows:

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- A. Improve the Amplifier/Recorder system to eliminate non-linear plotting.
- B. Standardize displays and calibration.
- C. Use 2 frequency illumination for testing full scale models; i.e., 'S' and 'L' band simultaneously.
- D. Improve the support for the scale model, *(make arrangement to rotate about fus. L with model vertical) **
- E. Activate low frequency equipment.
- F. Reduce warmup time with use of sequential timers.

A detailed explanation of the above recommendations is as follows:

- A. The presently used IF amplifiers and/or detector systems are not accurately logarithmic; therefore, it is not possible to record linearly in dbs. This non-linearity has 2 undesirable effects:
 1. It is necessary to construct a calibration scale for each chart or pattern produced just to read that individual chart.
 2. An incorrect visual impression may be had of the relative importance of some details of the pattern when 2 patterns are compared one to the other.

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It is our understanding that a "new" IF amplifier is now available. [REDACTED] says that this amplifier is much more accurately logarithmic than those now in use. This amplifier was designed and built by [REDACTED] people at [REDACTED] and is believed to be available through [REDACTED]. It is recommended that this amplifier and 4 others just like it be obtained for the new setup.

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- B. The use of a standard polar log chart to display all data on the same format will aid in the assimilation of the information by those who are not working with the charts on a day to day basis. In order to arrive at a standard of the calibration, it is recommended that a 42" diameter sphere be used for calibrating in lieu of the present 36" sphere which is in a severely damaged condition. In order to provide correlation between the information taken at the remote test site and that taken in our box, it is recommended that calibrations be set at 15 db. It is also recommended that, when necessary, a circle representing the current "goal" be added to each chart. It is also believed that a calibration run should be made twice a day; i.e., before start of testing operations in the morning and at noon. Consideration of motor-driven equipment wherever reduction of "time to accomplish" can be effected; i.e., correction of the corner reflection for calibration check, polarization changing, etc.
- C. The simultaneous use of 2 frequency illumination is feasible and would allow a substantial reduction of setup and recording time. By this method it would be possible to record the patterns at both 'S' and 'L' band simultaneously. In order to accomplish this, it would be necessary to acquire an additional recorder. The Scientific Atlantic Recorder such as we use here is recommended for this use.
- D. From present experience, it appears that a considerable improvement in the support for scale models is in order. It is recommended that 2 approaches be investigated. For example,
1. A string rig similar to that used in the black box, and
 2. A mylar bag incorporated integral model attachment.
- E. Considerable discussion has been held pro and con relative to activation of 70 megacycle equipment. Some of the arguments against activation of this equipment are as follows:
1. In order to get sufficient power on the target, it is necessary to move the transmitter antenna close to the target. This, of course, introduces phase errors due to the fact that the wave front is still spherical at the distances under consideration. A distance of 1,000 feet at 70 megacycles on a full scale model is equivalent of 25 feet at 'S' band on a 1/40th scale. A 1/8th scale model, on the other hand, at 600 megacycles, is equivalent to 25,000 feet or 4 nautical miles at a full scale frequency of 70 megacycles.
 2. Even with a 70 foot antenna tower, the ground plan problems will still be acute. These problems can probably be overcome, but this cannot be guaranteed.

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3. It is [REDACTED] opinion that it is impossible to hide the 50' pole at 70 megacycles. Ed and I do not concur in this feeling.
4. Because of the extreme short range, it will be impossible to operate the equipment in the pulse mode and therefore the cw type of transmission must be used. Because the pulse mode operation is not used, it will be impossible to gate out objects near the target. With this cw type operation, it will be necessary to balance the equipment and depend upon the distance between the target and any reflecting object to prevent their having an undesirable effect on the target return.

With the use of a 1/8th scale model, it is only necessary to hold tolerances to within plus or minus a half inch. This makes for good model building technique (?) It would be impossible to force our mechanics to work to this loose tolerance.

On the positive side of the 70 megacycle picture, it is felt that this equipment should be activated if for no other reason than to provide a means of testing ferrite materials at full scale frequency. It should be borne in mind that it is impossible at the present state of the art to scale these materials and therefore they must be tested in the final analysis at full scale.

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It is also felt that [REDACTED] do not have their best people on the project. Jack reports that they do not have any really good Electronic Engineers on the job at I.S. We feel that they should have their first team in and not their second or third. This is not a criticism of the boys on the job who have been most helpful and cooperative.

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LDM:bcz

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